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NASA-02463 (June 2004)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA

Superseding NASA-02463 (December 2003)

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SECTION 02463

WOOD PILES

06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers friction-type timber pile foundations.

Drawings must indicate plan layout and spacing of piles, design pile length, pile point reinforcement, location of adjacent existing construction, location of existing utilities and other interferences, and spoil areas on Government property.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

****

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM D 1143	(1981; R 1994e1) Piles Under Static Axial Compressive Load
ASTM D 1760	(2001) Standard Specification for Pressure Treatment of Timber Products
ASTM D 25	(1999e1) Round Timber Piles
ASTM D 390	(1992; R 1999) Standard Specification for Coal-Tar Creosote for the Preservative Treatment of Piles, Poles, and Timbers for Marine, Land, and Fresh Water Use

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS RR-S-331 (1989d) Shoes: for Wood Piles

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926 (2001) Safety and Health Regulations for Construction

1.2 SUBMITTALS

****
NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.
****

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-01 Preconstruction Submittals

Construction Equipment List shall be submitted.

Qualifications for Pile Driving and Qualifications of Personnel performing pile driving shall be submitted of the proposed piling organization.

SD-02 Shop Drawings

Fabrication Drawings for pile collars shall be submitted.

Erection/installation drawings shall be submitted for the following items:

Pile Collars
Piles

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Timber Piles
Preservative Treatment
Pile Joint Reinforcement

SD-06 Test Reports

Test reports shall be submitted in accordance with paragraph entitled, "Test Piles," of this section.

Driving Records shall be submitted by the Contractor in accordance

with paragraph entitled, "Driving Records," of this section.

SD-07 Certificates

Certificates of compliance shall be submitted for the following items showing conformance with the referenced standards contained in this section.

Timber Piles
Pressure Treatment
Pile Joint Reinforcement

Listing of Product Installations similar in scope to specified work shall be submitted.

1.3 SITE INFORMATION

Data on subsurface soil conditions indicated are not intended as representations or warranties of the continuity of such conditions between soil borings. Data are made available for the convenience of the Contractor. Government will not be responsible for interpretations or conclusions drawn by the Contractor. Additional soil borings and other exploratory operations may be made by the Contractor at no additional cost to the Government.

1.4 DRIVING RECORDS

Contractor shall submit driving record of piles not later than 4 calendar days after driving. Records shall contain the project name and number, date, name of Contractor, pile location, continuous record of the number of blows for each foot millimeter of penetration and any unusual occurrence during driving of the pile.

1.5 PROTECTION OF PERSONS AND PROPERTY

Pile driving operations shall ensure the safety of those exposed by adhering to OSHA Regulations 29 CFR 1926, Section 603, and 29 CFR 1926, Subpart C, for this type of activity.

Construction shall be protected from damage caused by pile-driving operations. Piles driven within 15 feet 4600 millimeter of construction shall be in pre-augered holes a minimum of 15 feet 4600 millimeter deep.

If there are adjacent structures, the Contractor shall provide bench marks on the structures, as designated, before pile driving is begun.

Contractor shall record and report the location and elevation of each bench mark before and after driving each pile and at least twice a day while driving is in progress.

In the event bench mark readings indicate displacement of adjacent structures, driving operations shall cease and be resumed only after corrective action has been approved.

1.6 QUALIFICATIONS FOR PILE DRIVING

Pile driving shall be performed by an organization experienced in this work. Contractor shall submit a written description of the proposed piling organization giving Qualifications of Personnel performing pile driving.

1.7 FABRICATION DRAWINGS

Fabrication drawings for Pile Collars shall be submitted by the Contractor prior to construction.

Erection/installation drawings for pile collars and Piles shall be submitted by the Contractor prior to construction.

1.8 CONSTRUCTION EQUIPMENT LIST

Construction equipment list for all major equipment to be used for construction shall be submitted by the Contractor prior to construction.

1.9 LISTING OF PRODUCT INSTALLATIONS

The Contractor shall provide a listing of product installations similar in scope to specified work prior to construction.

PART 2 PRODUCTS

2.1 TIMBER PILES

Piles shall conform to ASTM D 25, [Douglas fir] [southern pine] [oak] in one piece from point to butt, clean peeled. Pressure Treatment shall conform to ASTM D 1760. Coal-tar creosote Preservative Treatment shall conform to ASTM D 390.

2.2 PILE JOINT REINFORCEMENT

****

NOTE: Select pile point reinforcement type required. If none required, delete paragraph heading and the following paragraphs.

****

[Steel pile point reinforcement shall be steel plate pile shoe with solid steel point conforming to FS RR-S-331, Type I, size designation to suit pile tip diameter.]

[Malleable-iron pile point reinforcement shall be cast malleable-iron pile shoe with solid cast nose section and cross wedges, conforming to FS RR-S-331, Type II, size designation to suit pile tip diameter.]

PART 3 EXECUTION

3.1 TEST PILES

3.1.1 General Criteria

Test piles shall be driven and loaded in order to verify the assumed length and bearing load as approved. Testing shall be provided at no additional cost to the Government.

3.1.2 Number of Test Piles

****

NOTE: In the case of foundations having single piles only, select one of the following paragraphs

as applicable to the project. Where the foundation area is 5,000 square feet 465 square meter or less, select two test piles. Where the foundation area is over 5,000 square feet 465 square meter and less than 10,000 square feet 930 square meter, select three test piles. Where the foundation area is 10,000 square feet 930 square meter or over, select four test piles.

****

[Two] [Three] [Four] single test piles shall be provided.

****

NOTE: In the case of foundations having both single piles and pile groups, select the following paragraph.

****

[Two single test piles and one group of three test piles shall be provided.]

****

NOTE: In the case of foundations having pile groups only, select one of the following paragraphs as applicable to the project. Where the foundation area is less than 10,000 square feet 930 square meter, select one group of test piles. Where the foundation area is 10,000 square feet 930 square meter or over, select two groups of test piles.

****

[[One group] [Two groups] of three test piles shall be provided.]

3.1.3 Driving Test Piles

Test piles shall be the same class as specified and shall be driven with approved pile-driving equipment, operating at the same rated driving energy as that to be used in driving the permanent piles.

Test piles shall be driven at the location indicated to a point elevation below final cutoff elevation equal to the pile length specified as the basis of bids, or to refusal, whichever comes first. Refusal shall be when five blows of the hammer produce a penetration of not more than 1/4 inch 6 millimeter.

3.1.4 Design Load Per Pile

Design load per pile shall be [_____] tons newton.

3.1.5 Test Loads

Test load for each single test pile shall be 2 times the design load per pile.

Test load for each group of three test piles shall be 4-1/2 times the design load per pile group.

3.1.6 Pile Load Testing

Test piles, which have been in place not less than 48 hours, shall be

statically loaded to determine the load-settlement relationship of the test piles under a vertical axial load as specified in ASTM D 1143, and as follows:

Hydraulic jack shall be calibrated and certified within a period of not more than 10 calendar days before starting pile load test. Anchor piles shall be driven not closer than 3 feet 900 millimeter from test piles.

Apparatus for measuring settlement shall consist of two dial gage devices and one wire and scale device. Dial gages shall be calibrated and certified within a period of not more than 10 calendar days before starting pile load tests.

In the case of pile groups, test load shall be as specified and applied in 8 equal increments; settlement reading shall be to an accuracy of 0.001 inch0.025 millimeter. When the loading has been completed, the full test load shall remain on the pile for 48 hours. Not less than 48 hours shall elapse between driving and loading of the test pile.

3.1.7 Test Piles in Permanent Locations

Test piles indicated to be driven in permanent locations may be incorporated into the permanent structure after completion of testing and approval.

3.2 PREPARATION BEFORE DRIVING

3.2.1 Conditions

Piles shall not be driven until the earthwork has been completed as follows:

In excavations, earth excavation shall stop at an elevation of 12 inches 300 millimeter above the bottom of the footing before piles are driven. Final excavation to the required elevation of footing bottoms shall be done as a part of earthwork for structures after the piles have been installed and tested.

In fills, such fills shall be constructed and compacted to the indicated elevation.

Piles shall not be driven within 20 feet 6100 millimeter of any concrete or masonry structure that has not attained its full design strength.

3.2.2 Handling and Repair of Damage to Treated Piles

Treated piles shall be handled without dropping, breaking of outer fibers, bruising, or penetrating the surface. Peaveys, cant hooks, pikes, hooks, or pointed tools shall not be used in handling treated piles.

Piles shall be inspected in the leads for cuts, abrasions, and other damage to the protective shell of the treated wood. Cuts or damaged surface shall be given a brush treatment of wood preservative for treatment of cut surfaces, applied while hot, and in a quantity that will fill shakes and splits and penetrate the damaged surfaces.

3.2.3 Pile Length Marking

Before pile driving is begun, the pile length shall be marked on each pile

by painting a bar and the number of feet millimeter distant from the pile point, at intervals of 1 foot 300 millimeter.

3.2.4 Point Reinforcement

****
NOTE: Delete paragraph heading and the following paragraph if point reinforcement is not required.
****

[Specified point reinforcement shall be securely attached to the point of each pile.]

3.3 PILE DRIVING

3.3.1 General Requirements

Each pile shall be continuously driven at the locations indicated to the required point elevation and driving resistance established by driving and loading test piles as specified.

3.3.2 Driving Tolerances

Piles shall be driven within the maximum permissible tolerances as follows:

Location: 3 inches 75 millimeter from the location indicated for the center of gravity of single piles or pile groups

Plumbness: 1/4 inch per foot 6.2 millimeter per 300 millimeter of pile length, from the vertical

Batter angle: 1/2 inch per foot 12.5 millimeter per 300 millimeter of pile length, from the required angle

3.3.3 Pre-Augered Holes

Piles shall be driven in pre-augered holes drilled to a depth of [_____] [10] feet [3000] millimeter. Diameter of hole shall be the diameter of the pile.

3.3.4 Jetting

[Piles may be driven with the aid of water jets only when approved. Jetting may be permitted in the event that the required penetration is not obtained by other driving methods. Piles shall be driven the final 3 feet 900 millimeter without the aid of water jets.]

[Jetting will not be permitted.]

3.3.5 Redriving of Heaved Piles

Instrument observations shall be made during pile driving to determine whether a driven pile has lifted from its original seat during the driving of adjacent piles. If uplift occurs, piles so affected shall be redriven to a point elevation at least as deep as the original point elevation and a driving resistance at least as great as the original driving resistance, as directed, at no additional cost to the Government.

3.3.6 Damaged and Misdriven Piles

Damaged piles and piles driven outside the specified driving tolerances will not be accepted.

Piles rejected after driving shall be withdrawn and replaced with new piles at no additional cost to the Government.

When the space left by a withdrawn pile will not be filled by the pile driven to replace the withdrawn pile such space shall be filled with gravel or sand.

When directed, piles rejected after driving may be abandoned and cut off; and additional piles shall be driven to replace the rejected piles at the newly designated locations at no additional cost to the Government.

3.3.7 Splicing

Splices in timber piles will not be permitted.

3.3.8 Cutting Off Piles

Tops of driven piles shall be cut off square with the pile axis at the cutoff elevations indicated. Cutting shall be done by approved means.

3.3.9 Treatment of Cut Surfaces

Cutoff surface of piles shall be given not less than three coatings of specified wood preservative for treatment of cut surfaces, applied while hot, in the quantity that will penetrate the cut surfaces. Time shall be allowed between each coating to permit absorption of the wood preservative.

3.4 WITHDRAWING AND REDRIVING

3.4.1 Withdrawing Piles for Test and Inspection

When directed, selected piles shall be withdrawn for test and inspection to determine the condition of the piles after driving.

3.4.2 Redriving

Piles withdrawn for test and inspection shall be redriven unless damaged or found not meeting the requirements.

Cost of withdrawing and redriving of piles found satisfactory will be paid by the Government.

Rejected piles shall be replaced with new piles at no additional cost to the Government.

3.5 DISPOSAL OF WASTE MATERIALS

3.5.1 Burning on Government Property

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NOTE: Delete the first of the following paragraphs when burning on Government property is not permitted. Delete the second of the following paragraphs when burning on Government property is

permitted.

****

[Combustible waste materials, except rejected piles, shall be transported to the areas designated and disposed by burning. Fires shall be controlled in a manner to provide protection of persons and property. Fires shall be kept under constant attendance until the fires have burnt out or have been extinguished.]

[Burning of waste materials will not be permitted on Government property.]

3.5.2 Removal to Spoil Areas on Government Property

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NOTE: Delete paragraph heading and the following paragraph when disposal on Government property is not permitted.

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[Noncombustible waste materials and rejected piles shall be transported to and disposed in indicated waste area.]

3.5.3 Removal from Government Property

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NOTE: Delete paragraph heading and the following paragraph when disposal on Government property is permitted.

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[Waste materials shall be removed from Government property and legally disposed at no additional cost to the Government. Permits and fees for disposal shall be paid by the Contractor.]

-- End of Section --